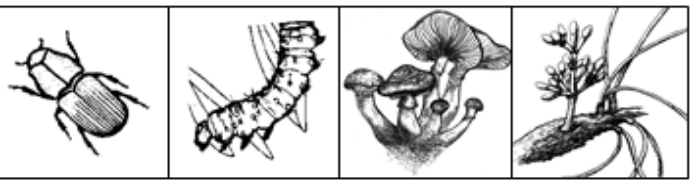
Forest Health Protection



17-03 *MARCH, 2017*

Pitch Moth Response to High Dose Pheromone Lures in Western Montana

Sandra Kegley[1] and Nancy Sturdevant[2]

[1] Forest Entomologist, Forest Health Protection, Coeur d' Alene, Idaho
[2] Forest Entomologist, Forest Health Protection, Missoula, Montana

Sequoia pitch moth, *Synanthedon sequioiae*, (SPM) and Douglas-fir pitch moth, *Synanthedon novaroensis*, (DFPM), both attack the boles and large branches of pine trees, especially those growing in tree improvement areas (TIA) and other trees growing off-site or that are stressed. They feed in the cambium of host trees causing large masses of pitch to form on the tree bole and can eventually cause branch and stem breakage.

Options are limited to manage pitch moth populations. No insecticides have been proven effective in reducing impacts from SPM or DFPM. Wrapping tree boles with flexible tree wrap has protected trees from attack, (Sturdevant et al. 2016, Sturdevant et al. in prep; Strong, personal communication) but is very labor intensive. Multiple years of mass trapping has shown promise in reducing pitch moth populations (Sturdevant et al. 2016, Sturdevant et al. in prep). Three different trap types baited with 1 mg attractant pheromone lures were equally effective in catching pitch moths (Kegley & Sturdevant 2016). The objective of this study was to determine the most effective pheromone dose to attract pitch moths using one trap type—bucket traps (Unitrap), because of their durability and high trap catch capacity (Kegley et al. 2016, Rocchini et al. 2003).

Methods

The study was conducted at Big Creek TIA located south of Haugen, Montana on the Lolo National Forest (PM, T19N, R30W, sec 33; N47.37764, W115.39731) in lodgepole pine plantations at an elevation of 3,179 feet. Trees ranged in size from 4-9" diameter 4.5' from the ground (d.b.h.) and most contained multiple masses from pitch moth feeding. We tested lure strengths of 1 mg, 3 mg, and 10 mg of the pheromone (Z, Z)-3, 13-octadecadien-1-ol loaded on rubber septa (ChemTica International). Lures were placed in the receptacle on the lid of bucket traps and a ½ strip of Hercon® Vaportape™ II placed inside the bucket to kill any trapped moths before they could escape.

Ten traps baited with each pheromone lure were randomly placed about 2 chains apart (132 feet) in a completely randomized design throughout two lodgepole pine blocks. Traps were placed on May 11, 2016 and removed on August 8, 2016. Species and sex of pitch moths were tallied bi-weekly.

United States Department of Agriculture	Forest Service	Northern Region	Region One 26 Fort Missoula Rd Missoula, MT 59804-7203	

A one-way analysis of variance (ANOVA) test was used to detect any significant differences in moths trapped with each lure.

Results and Discussion

A total of 476 pitch moths were caught in all traps with all lure dosages. Of these, 451 were SPMs and 25 were DFPMs (table 1). Most moths caught were males, but 29 female SPM were also caught. One large female was observed hovering around a trap on June 13 (figure 1).

Total pitch moths caught by lure dosage were 129 with 1 mg lures, 141 with 3 mg lures, and 206 with 10 mg lures.

Table 1. Number of male and female sequoia pitch moths (SPM) and Douglas-fir pitch moths caught in bucket traps with different lure strengths.

Lure Dosage	SPM males	SPM females	DFPM males	Total
1 mg	114	7	8	129
3 mg	126	8	7	141
10 mg	182	14	10	206
Total	422	29	25	476

Figure 1. The blue circle indicates a large female SPM hovering around a baited bucket trap.

The 10 mg lure caught the most pitch moths over the flight period but mean trap catches were not significantly different between the different lure dosages ($F = 0.81$, $p = 0.45$). Variability in mean moth catches by individual trap and lure dose was high, which explains the lack of significant differences (figure 2).

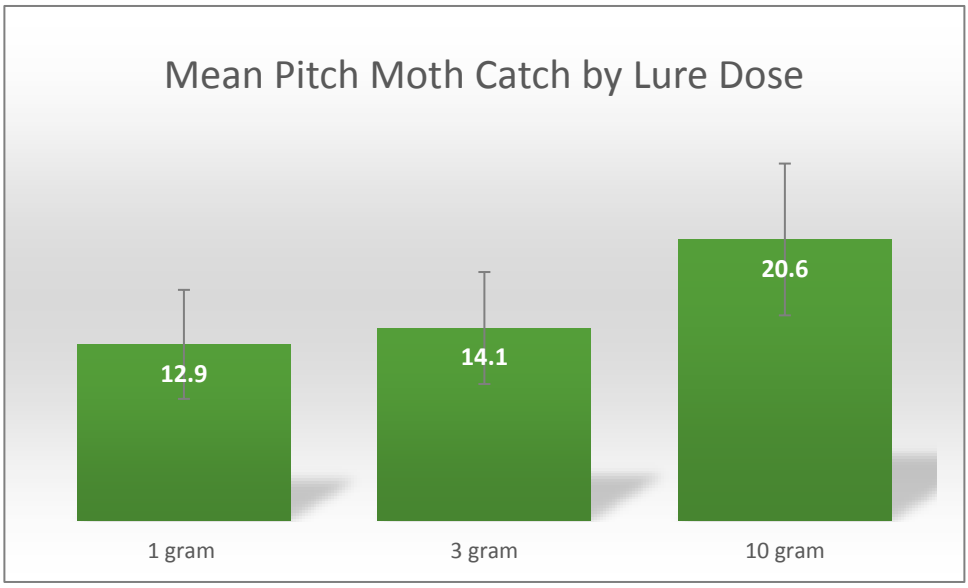


Figure 2. Average total pitch moths (both species) caught in individual traps by lure dose.

One SPM was caught on June 1, about two weeks after traps were checked on May 17. This marked the very beginning of SPM flight in 2016. It was caught in a trap baited with a 10 g. lure. Most pitch moths were caught on July 11 and the last six were caught on August 8, after which traps were removed (figure 2). In 2015 during our study of different trap types, most pitch moths were caught on June 26 about two weeks earlier than 2016 (Kegley & Sturdevant 2016). The summer of 2015 was unusually hot and dry, which could explain the earlier peak flight. In both years, DFPMs were caught in the early weeks of SPM flight, but not the later weeks. In 2015, the last DFPMs were caught on June 26 and in 2016, the last ones were caught on July 11.

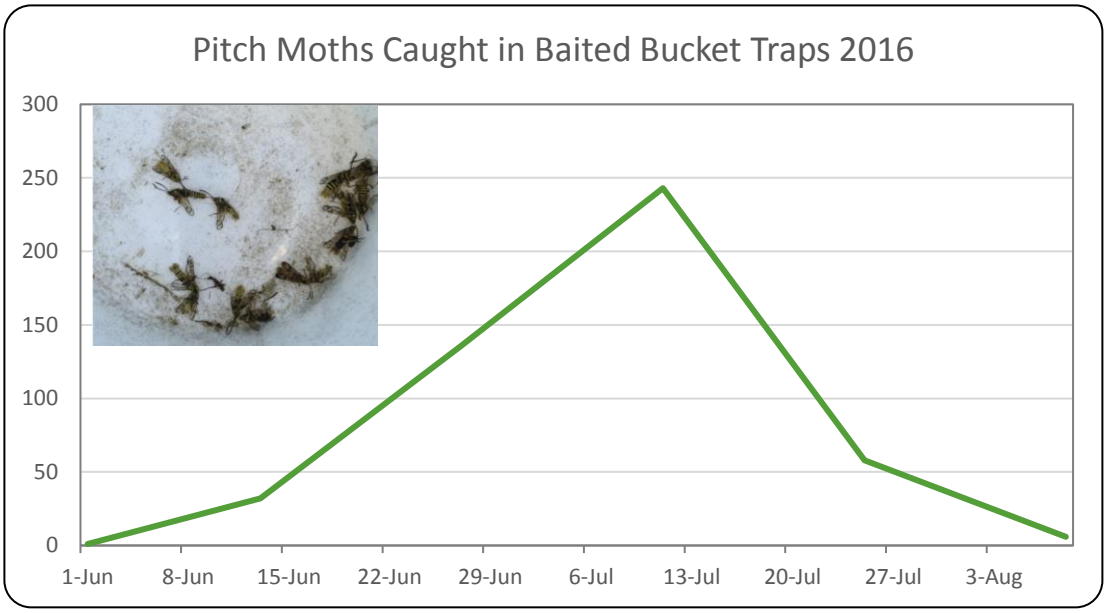


Figure 3. Numbers of both sequoia and Douglas-fir pitch moths caught in pheromone traps in Montana in 2016. Traps were deployed on May 11.

Our results show that any of the three lure doses tested can be used in traps to catch pitch moths. Pheromone baited traps used multiple years have reduced pitch moth populations in tree improvement areas (Sturdevant et al. in prep). The greatest success will be achieved in areas isolated from pine host type that don't have immigration of moths from adjacent areas.

Acknowledgements

ChemTica International provided the traps and pheromone lures used in this study. The study was done in cooperation with Val Walker, Genetic Resources Forester, on the Lolo National Forest. Chris Hayes, entomologist, Northeast Area FHP, did the statistical analysis.

References

Kegley, S.; Sturdevant, N. 2016. Effect of Trap Type on Pitch Moth Trapping in Western Montana. Rep.16-04. U.S. Department of Agriculture, Forest Service, Northern Region, Forest Health Protection. 5 p.

Rocchini, L.A.; Lindgren, B.S.; Bennett, R.G. 2003. Douglas-fir pitch moth, *Synanthedon novaroensis* (Lepidoptera: Sesiidae) in North-Central British Columbia: Flight period and the effect of trap type and pheromone dosage on trap catches. Environmental Entomology 32(1): 208-213.

Sturdevant, N.; Kegley, S.; Crane, B.; and Hayes, C. 2016. Evaluation of Trapping and Tree Wrapping as Management Tools to Reduce Damage from Sequoia Pitch Moth at the Big Fork Tree Improvement Area. Rep.16-06. U.S. Department of Agriculture, Forest Service, Northern Region, Forest Health Protection. 4 p.

Sturdevant, N.; Kegley, S.; Crane, B. [N.d.]. Evaluation of Management Options to Reduce Sequoia Pitch Moth Damage at Bigfork and Plains Tree Improvement Areas. Manuscript in preparation.

Strong, Ward, PhD. 2015. Personal communication. Research Scientist, Kalamalka Research Station, BC Ministry of Forests, British Columbia, Canada.